

CLAIMS

What is claimed is:

1. A multiple-speed ratio automatic transmission for an automotive vehicle, comprising:
 - an input;
 - an output;
 - a planetary gear system comprising first, second and third planetary gear units, each gear unit having a sun gear, a ring gear, planet pinions meshing with the sun gear and planet pinions meshing with the ring gear, and a carrier rotatably supporting the planet pinions, the input being driveably connected to the sun gear of the first gear unit, the output being driveably connected to the carrier of the third gear unit, the ring gear of the third gear unit being driveably connected to the carrier of the second gear unit, one of the carrier of the first gear unit and the ring gear of the first gear unit being secured against rotation, the sun gear of the second gear unit being driveably connected to the sun gear of the third gear unit;
 - a first brake for holding against rotation and releasing the ring gear of the second gear unit;
 - a second brake for holding against rotation and releasing the carrier of the second gear unit and ring gear of the third gear unit;
 - a first clutch for driveably connecting and disconnecting the input and the sun gears of the second and third gear units;
 - a second clutch for driveably connecting and disconnecting the input and carrier of the second gear unit; and
 - a third clutch for releasably driveably connecting the other of the carrier of the first gear unit and the ring gear of the first gear unit to the ring gear of the second gear unit.

2. The transmission of claim 1, wherein the second
brake means comprises:

a friction brake including a first element driveably
5 connected to the carrier of the second gear unit and the ring
gear of the third gear unit, and a second element secured
against rotation, the first element and second element adapted
to engage mutually, thereby holding the carrier of the second
gear unit and ring gear of the third gear unit against
10 rotation, and to disengage, thereby releasing the carrier of
the second gear unit and ring gear of the third gear unit for
independent rotation.

3. The transmission of claim 1, wherein the second
15 brake means comprises:

a friction brake including a first element driveably
connected to the carrier of the second gear unit and ring gear
of the third gear unit, and a second element secured against
rotation, the first element and second element adapted to
20 engage mutually, thereby holding the carrier of the second
gear unit and ring gear of the third gear unit against
rotation, and to disengage, thereby releasing the carrier of
the second gear unit and ring gear of the third gear unit for
independent rotation; and

25 an overrunning coupling including a third element
driveably connected to the carrier of the second gear unit and
ring gear of the third gear unit, and a fourth element secured
against rotation, and a fifth element located between the
third element and fourth element for producing a one-way drive
30 connection between the third element and fourth element.

4. The transmission of claim 1, further comprising a
transmission case fixed against rotation, and wherein the
second brake further comprises:

a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear, and a second element driveably connected to the transmission case; and

- 5 an overrunning coupling arranged in parallel drive relationship with the friction brake clutch, for producing a one-way drive connection of the carrier of the second gear unit and ring gear of the third gear unit to the transmission case.

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5. The transmission of claim 1, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

- 15 a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a second element driveably connected to the transmission case.

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6. The transmission of claim 1, further comprising:
a torque converter including an impeller driveably connected to a power source, and a turbine hydrokinetically coupled to the impeller and driveably connected to the input shaft.

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7. A multiple-speed ratio automatic transmission for an automotive vehicle, comprising:

- an input;
an output;
a planetary gear system comprising first, second and third planetary gear units, each gear unit having a sun gear, a ring gear, planet pinions meshing with the sun gear and ring gear, and a carrier rotatably supporting the planet pinions, the input being driveably connected to the sun gear of the first gear unit, the output being driveably connected to the carrier of the third gear unit, the ring gear of the third

gear unit being driveably connected to the carrier of the second gear unit, the ring gear of the first gear unit being secured against rotation, the sun gear of the second gear unit being driveably connected to the sun gear of the third gear
5 unit;

a first brake for holding against rotation and releasing the ring gear of the second gear unit;

10 a second brake for holding against rotation and releasing the carrier of the second gear unit and the ring gear of the third gear unit;

a first clutch for driveably connecting and disconnecting the input and the sun gears of the second and third gear units;

15 a second clutch for driveably connecting and disconnecting the input and carrier of the second gear unit;

a third clutch for releasably driveably connecting the carrier of the first gear unit to the ring gear of the second gear unit.

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8. The transmission of claim 7, wherein the second brake means comprises:

25 a friction brake including a first element driveably connected to the carrier of the second gear unit and the ring gear of the third gear unit, and a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of
30 the second gear unit and ring gear of the third gear unit for independent rotation.

9. The transmission of claim 7, wherein the second brake means comprises:

a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for independent rotation; and

10 an overrunning coupling including a third element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a fourth element secured against rotation, and a fifth element located between the third element and fourth element for producing a one-way drive connection between the third element and fourth element.

10. The transmission of claim 7, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

20 a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a second element driveably connected to the transmission case; and

25 an overrunning coupling arranged in parallel drive relationship with the friction brake clutch, for producing a one-way drive connection of the carrier of the second gear unit and ring gear of the third gear unit to the transmission case.

30 11. The transmission of claim 7, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

 a friction brake having a first element driveably connected to the carrier of the second gear unit and ring gear

of the third gear unit, and a second element driveably connected to the transmission case.

12. The transmission of claim 7, further comprising:
5 a torque converter including an impeller driveably connected to a power source, and a turbine hydrokinetically coupled to the impeller and driveably connected to the input shaft.

10 13. A multiple-speed ratio automatic transmission for an automotive vehicle, comprising:

an input;
an output;
a planetary gear system comprising a first compound
15 planetary gear unit, second and third simple planetary gear units, each gear unit having a sun gear, a ring gear, planet pinions meshing with the sun gear and with the ring gear, and a carrier rotatably supporting the planet pinions, the input being driveably connected to the sun gear of the first gear
20 unit, the output being driveably connected to the carrier of the third gear unit, the ring gear of the third gear unit being driveably connected to the carrier of the second gear unit, the carrier of the first gear unit being secured against rotation, the sun gear of the second gear unit being driveably
25 connected to the sun gear of the third gear unit;

a first brake for holding against rotation and releasing the ring gear of the second gear unit;

30 a second brake for holding against rotation and releasing the carrier of the second gear unit and ring gear of the third gear unit;

a first clutch for driveably connecting and disconnecting the input and the sun gears of the second and third gear units;

a second clutch for driveably connecting and disconnecting the input and carrier of the second gear unit; and

5 a third clutch for releasably driveably connecting the ring gear of the first gear unit to the ring gear of the second gear unit.

14. The transmission of claim 13, wherein the second brake means comprises:

10 a friction brake including a first element driveably connected to the carrier of the second gear unit and the ring gear of the third gear unit, and a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for independent rotation.

15. The transmission of claim 13, wherein the second brake means comprises:

20 a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for independent rotation; and

25 an overrunning coupling including a third element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a fourth element secured against rotation, and a fifth element located between the

third element and fourth element for producing a one-way drive connection between the third element and fourth element.

16. The transmission of claim 13, further comprising a
5 transmission case fixed against rotation, and wherein the
second brake further comprises:

a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a second element driveably
10 connected to the transmission case; and

an overrunning coupling arranged in parallel drive relationship with the friction brake clutch, for producing a one-way drive connection of the carrier of the second gear unit and ring gear of the third gear unit to the transmission
15 case.

17. The transmission of claim 13, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

20 a friction brake having a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a second element driveably connected to the transmission case.

25 18. The transmission of claim 13, further comprising:
a torque converter including an impeller driveably connected to a power source, and a turbine hydrokinetically coupled to the impeller and driveably connected to the input shaft.

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